**Decision statement**

* Two way selection ( if / else )

If a patient is male and is above 55 years old, his risk of having heart disease

Is 0.55, otherwise, the risk of heart disease is 0.25

Decision condition

true false

True action

False Action

* Basic syntax for if statement

if (condition)

statement 1

else

statement 2

if ((gender == ‘m’) && (age > 55))

risk = 0.55;

else

risk = 0.25;

Notes:

1. entire logical expression in ()
2. every action statement ends with ;
3. no ; after if and else part of the statement
4. the action statement can be any statement (even another if/else statement, or null statement)
5. true and/or false action can contain multiple statements, e.g., compound statement

* **if statement with null else statement (else statement empty)**

if (condition)

statement

int smallerInt, largerInt;

int temp;

cout << “Please enter two integer values”;

cin >> smallerInt >> largerInt;

if (smallerInt > largerInt)

{

temp = smallerInt;

smallerInt = largerInt;

largerInt = temp;

}

* **if / else statement with compound action statement**

if (condition)

{

statement1

…..

statement N

}

else

{

statement1

…..

statement M

}

* **action statement is an if / else statement**

The medical insurance premium is sometimes calculated based on customer’s age

Age <= 26 premium = $10/month

26 < age < 55 premium = $23/month

age >=55 premium = $40/month

## **as true action statement** **as false action statement**

if (age < 55) if (age >= 55)

{ premium = 40.0;

if (age <= 26) else

premium = 10.0; {

else if (age > 26)

premium = 23.0; premium = 23.0

} else

else premium = 10.0;

premium = 40.0; }

Often, when the false action statement is an if/else statement, it is coded using

***Multi-way if statement, (aka if / else if / else*** statement), as the following:

if (age >= 55)

premium = 40.0;

else if (age > 26)

premium = 23.0;

else

premium = 10.0;

Question:

What if the premium is determined with the following 4 ranges?

age <= 26 premium = 10.0;

26 < age <= 40 premium = 18.0;

40 < age < 55 premium = 25.0;

age >= 55 premium = 40.0;

* **Dangling else problem:**

if (average >=60)

if (average < 70.0)

cout << “Passing but marginal”<< endl

else

cout << “Failing” << endl;

* **What is the difference between the following two C++ statements?**

if (age < 2)

cout << “Admission is free” << endl;

if (age < 12)

cout << “Children pays half price.” << endl;

if (age < 18)

cout << “students get 20% off.” << endl;

if (age < 55)

cout << “pay full price.” << endl;

if (age >=55)

cout << “senior pays half price.” << endl;

if (age < 2)

cout << “Admission is free” << endl;

else if (age < 12)

cout << “Children pays half price.” << endl;

else if (age < 18)

cout << “students get 20% off.” << endl;

else if (age < 55)

cout << “pay full price.” << endl;

else

cout << “senior pays half price.” << endl;

* **Practice problems:**

1. Write a C++ decision statement that computes the pay for an employee, given the employee’s pay rate and number of hours he worked. If the employee works more than 40 hours, the additional hours is paid at 1.5 of his original hourly pay rate.
2. Prompt the user to enter the current month in the form of a number (1-12) and display the corresponding name of the month.
3. Add on to question 2 : checking user input on month value to make sure that it is a valid input, i.e., 1<=month<=12. Give appropriate error message if it is invalid.
4. If you are prompting the user to enter his/her birth date, i.e., year, month, and day, how to validate the input?
5. Write an branching statement that calculates and returns the amount of the water bill for a customer whose type is 'H' for home use, 'C' for commercial use, and 'I' for industrial use. The rates are as follows:

Type Rate

------- ---------------------------------------------------------------------------------------------

H $5.00 plus 0.0005 per gallon water used

C $1000.00 for first 4 million gallons and $0.00025 per additional gallon

I $1000.00 if usage is 4 million gallons or less; $2000.00 for usage over 4 million

but less than 10 million gallons; and $3500.00 for use of 10 million or more gallons

Print error message and stop the program if there is an error in the input arguments (e.g., an illegal type or a negative usage.)

1. Write a C++ program that inputs a single letter and prints out the corresponding digit on the telephone. The letters and digits on a telephone are grouped as this:

2 = ABC 4 = GHI 6 = MNO 8 = TUV 3 = DEF 5 = JKL 7 = PRS 9 = WXY

no digits corresponds to Q or Z. For these two letters, your program should print a message

indicating that they are not used on a telephone. The program only recognizes capital letters. Include small letters as part of the invalid characters. Give an error message when a non-capital letter character is entered.